

JAMAICAN LAND SNAILS, 4

BY H. BURRINGTON BAKER

(Plates 8, 9)

The first paper of this series appeared in the first number of vol. 48; the symbols used for localities are explained on pages 7 to 9. In the following key to the Jamaican groups of Sagdinae, defining new subgenera, the abbreviated labels of pl. 8, fig. 1 are used.

A., appendix of penis (convoluted inside connective tissue sheath so that tip is attached to side of PA); C, carrefour; D, vas deferens; E, epiphallus (demarcated from PE by simple constriction; develops capsules of spermatophore); F, flagellum (structure as in *Hojeda* but more complex; develops fringed tail of spermatophore); FA, accessory flagellum; G, albumen gland; H, hermaphroditic duct; M, prostate; O, ovotestis; P, trunk of penis; PA, appendicular branch of penis (tip of evaginated organ in most species; with thickened rim around entrance of A.); PE, epiphallar branch of penis (usually not evaginated; apparently develops apical spine of spermatophore); PR, penial retractor (origin from diafram); S, spermathecal sac; SD, spermathecal duct (slender part); SR, spermathecal retractors (origins from ring around base of albumen gland); SS, secondary spermatheca (enlarged stalk; contains spermatophore in one species); T, atrium; U, oviduct (uterus + free oviduct); V, vagina.

A(B) g. *Volvidens*, type *V. tichostoma* (Pfr.); anatomy unknown; shell with parietal lamella. Also with palatal and basal teeth; type *V. triodon* n. sp. sg. **Trifaux** new.

B(A) g. *Hyalosagda*; anatomy fundamentally like that of *Proserpinula*; shell without parietal lamella. (I) smaller species (excl. s.s.); apparently oviparous; pr inserted on side of e; f more flattened (with 1 or 2 series of caeca); jaw plaited. (H) mantle collar not broadly expanded; shell perforate to umbilicate (excl. *osculans* and *simplex*). (F) sg. *Lacteoluna*; f shorter than p+pe+e; most radular marginals with pointed entocones. (E) pr inserted considerably below entrance of d. (D) later shell whorls with irregular, coarse growth-wrinkles that collect dirt. (C) protoconch with sharp spirals on last whorls; type *H. selenina* (Gld.) st. *Lacteoluna* Pils.

C(B) protoconch with irregular pits and obsolescent spirals; type *H. subpyramidalis* (C.B.A.), incl. (animal unknown) *H. (Vilitas) omissa* (Pils.) st. *Aerotrochus* Pils.

D(B) later shell whorls with clean rib-striae like *Strialuna* but more arcuate; protoconch smoothish with growth-lines most prominent sculpture; type *H. epistyliulum* (C.B.A.)

st. *Microsagda* new.

E(B) protoconch with forwardly and backwardly oblique threads separated by similarly arranged pits; later whorls with very fine, sharp, close rib-striae (type also with distant riblets); pr near d; type *H. diminuta* (C.B.A.) st. *Strialuna* Pils.

F(B) f longer than p+pe+e. (G) mantle with some black pigment; protoconch smoothish with traces of x-lines and slightly stronger spirals; later whorls with sharp criss-cross diagonal threads; outer radular marginals with pointed entocones; jaw thin; type *H. anthoniana* (C.B.A.)

sg. *Stauroglypta* new.

G(F) mantle jet black, visible through almost smooth, transparent shell; marginals rarely with entocones; jaw with central plaits thickened; type *H. similis* (C.B.A.)

sg. *Hyalosagda* Albers.

H(B) g. *Proserpinula* Albers, type *P. discoidea* (C.B.A.); mantle collar broadly expanded, capable of covering part of shell; radular marginals with largest cone spatulate and apically bifid (pl. 8 f. 2); shell imperforate, very smooth with thin epidermis.

I(B) g. *Sagda*; larger species or without transparent shell; ovoviviparous (all?); pr inserted at base of e; f long and more rounded; jaw striate; radular marginals rarely with entocones; shell imperforate. (K) secretive species with whitish to grayish, thinner integument; sd attached to tip of ss and paralleled by sr to base of g; fa not much longer than width of e; a. not excessively long; t short; shell with narrow whorls and with basal and columnar lamellae usually present. (J) pa longer than pe; shell with less swollen last whorl and less convex base; type *S. jayana* (C.B.A.)

st. *Parahelix* v. Iher.

J(I) pa shorter than pe; shell with swollen last whorl and convex base; x-striae usually evident; type = *S. cookiana* (Gm.)

st. *Sagda* Beck.

K(I) g. *Zaphysema*; usually active species with thick, colored (olive to reddish) integument; sd attached below tip of ss which extends to base of g; t about as long as pe; shell brownish, hirsute at some stage. (L) fa as long as e; pa longer than pe but a. not excessively long; shell quite closely coiled, often with peripheral internal lamina; type *Z. lamelliferum* (C.B.A.)

sg. *Meiophysema* new.

L(K) fa often large; pa shorter than pe and a. several times as long as animal; shell with rapid whorl increase and without laminae; type *Z. tenerrimum* (C.B.A.) sg. *Zaphysema* Pils.

Volvidens (Trifaux) triodon new species. Plate 8, figs. 9 to 11.

Shell minute, umbilicate, with low domed spire and high narrow whorls; whitish corneous but collecting dirt. Embryonic whorls $2\frac{1}{8}$; apical $\frac{3}{4}$ ($1\frac{1}{4}$ sutural count) very rapidly increasing to form a small cap which is partly hidden by next whorl and limited by a sulcus; remainder with spiral rows of extremely fine points. Later whorls shouldered above and below with (at least on last) a sulcus midway between; with irregularly spaced major threads (32 on last) and extremely fine, very irregular, very closely spaced, minor wrinkles which are often beaded although continuous spirals are lacking; accumulating dirt so as to give at least the appearance of deciduous growth riblets. Umbilicus 3.9 times in maj. diam. Aperture trefoil; peristome sharp and almost vertical, with just behind it a palatal nodule opposite the sulcus and a basocolumellar one; parietal wall (penult wh.) with a low rounded lamella which is present as deep as visible and emerges $\frac{1}{2}$ whorl. Alt. of type (figs.) 1.75 mm., maj. diam. 150 (2.63 mm.), min. diam. 141 (2.46 mm.), alt. apert. 52 (.91 mm.), diam. apert. 110 (1.00 mm.), with $5\frac{1}{4}$ whorls. Type locality (ANSP. 163915): WWF.

Hyalosagda (Strialuna) haplotrema new species. Plate 8, figs. 4 to 6.

Shell with $1\frac{1}{2}$ embryonic whorls about half again as large as in *H. sincera*, and very sharply but similarly sculptured. Later whorls more evenly rounded, with subequal, extremely fine, sharp, close rib-striae and without tendency towards major riblets that especially characterize var. *diminuta*. Umbilicus relatively larger (3.2 times in maj. diam.). Peristome sharp almost vertical, little arcuate. Alt. of type (figs.) 1.99 mm., diam. 191 (3.81 mm.), min. diam. 178 (3.55 mm.), alt. apert. 69 (1.38 mm.), diam. apert. 104 (1.44 mm.), with $4\frac{1}{4}$ whorls.

Type locality (ANSP. 163916): MN3e. *H. haplotrema* superficially resembles *H. inconspicua* (C.B.A.) but the latter has whorls shouldered above and below, a relatively smaller umbilicus and much more arcuate rib-striae and peristome.

Sagda kingswoodi new species. Plate 9, figs. 6 and 7.

Shell small and thin, straw-colored. Spire convex, noticeably lower than height of last whorl; first $1\frac{1}{2}$ whorls almost smooth, remainder with weak growth-wrinkles becoming almost obsolete below periphery, crossed by microscopic, obliquely criss-cross striae (as usual in *Sagda* s.s.). Last whorl high, weakly suban-

gulate; base very convex, narrowly but deeply funicular. Basal lamina (fig. 6) thin but continuous, stopping about $\frac{1}{2}$ whorl inside of peristome and extending almost $\frac{3}{4}$ whorls; columellar lamella steeply inclined and quite high, stopping about $\frac{1}{8}$ whorl inside and extending $\frac{1}{2}$ whorl. Alt. of type (fig. 7) 11.5 mm., maj. diam. 118 (13.6) min. diam. 114 (13.1 mm.); almost 7 whorls. Dimensions of another: 11.2, 127 (14.5), 121 (13.8); $7\frac{1}{4}$ whorls.

Type locality (ANSP. 163918): WC2, along buttresses of a silk-cotton tree. *S. kingswoodi* has a much more impressed base than any other species of *Sagda* s.s. except *S. cookiana*, which is a much larger species with an interrupted basal lamina.

S. (Parahelix) connectans catadupae new subspecies. Plate 9, figs. 10, 11.

Shell smaller and usually more elevated, with more convex spire and with coarser growth-wrinkles. Lamellae (fig. 10) much as in typical *S. connectans*. Alt. of type (fig. 11) 13.1 mm., maj. diam. 128 (16.7 mm.), min. diam. 123 (16.1 mm.); $8\frac{1}{2}$ whorls. Dimensions of another: 11.8, 143 (16.9), 138 (16.3); almost 8 whorls.

Type locality (ANSP. 163919): VW2. In sculpture and form, this subspecies slightly approaches *S. epistylionides* (Fér.).

S. (P.) occidentalis new species. Plate 9, figs. 3 to 5.

Shell heavy, low (type) to medium (fig. 5) in height; base moderately concave. Growth sculpture above periphery of post-embryonic whorls about as coarse as in *S. maxima*, weaker on last whorl and obsolete below periphery; microscopic criss-cross striae obsolete. Internal lamellae (fig. 4) situated much as in *S. connectans* and *S. epistylionides* but shorter; basal lamina stopping $\frac{1}{8}$ whorl from peristome, high for $\frac{1}{2}$ whorl but visible for almost $\frac{1}{2}$ whorl more; columellar lamella about $\frac{3}{8}$ whorl in length and reaching to within $\frac{1}{4}$ whorl of peristome, heavy, low and with outer side almost vertical. Alt. of type (fig. 3) 18.8 mm., maj. diam. 139 (26.1 mm.), min. diam. 127 (23.9 mm.), with $7\frac{3}{4}$ whorls; dimensions of fig. 5: 19.7, 122 (24.1), 116 (22.8) with $8\frac{1}{4}$.

Type locality (ANSP. 163920): WWF. Although superficially similar to young shells of *S. maxima* in appearance, *S. occidentalis* is structurally almost intermediate between the *connectans-epistylionides* and the *jayana-adamsiana-montegoensis*

groups. It is nearest *S. epistylionoides* but has considerably weaker and more irregular growth wrinkles.

S. (P.) spei portlandensis new subspecies. Plate 9, figs. 8 and 9.

Shell with more conoid apex and less convex outlines. Columellar lamella (fig. 8) low and rounded but more extensive, forming a weak but distinct swelling on the peristome. Alt. of type (fig. 9) 19.4 mm., maj. diam. 110 (21.3 mm.), min. diam. 104 (20.2 mm.), with $9\frac{1}{4}$ whorls.

Type locality (ANSP. 163921): EEJb. This subspecies approaches *S. torrefacta* (C.B.A.) in both of its points of difference from typical *S. spei*.

S. (P.) maxima jacobensis new subspecies. Plate 9, figs. 1 and 2.

Shell with finer and weaker growth wrinkles and thus appearing smoother than typical, coarsely sculptured *S. maxima*. Alt. of type (fig. 1) 28.4 mm., maj. diam. 110 (31.3 mm.) min. diam. 99 (28.1 mm.), with $8\frac{1}{2}$ whorls.

Type locality (ANSP. 163922). VF. This subspecies somewhat approaches *S. alligans* (C.B.A.) in appearance but completely lacks lamellae (fig. 2).

Brachypodella (Geoscala) costulata savlamari new subspecies.

Plate 8, fig. 3.

Shell with less pronounced suture and with more closely spaced ribs (18 on last adnate wh.; 10 on "neck"), which are weak or obsolete near middle of last 2 or 3 whorls; last half whorl deeply sulcate. Alt. of type (fig.) 6.61, diam. 2.52, diam. spire 2.11, alt. last wh. 2.87, alt. apert. 1.41, diam. apert. 1.58 mm., with $7\frac{1}{4}$ whorls remaining ($+7\frac{1}{2}$).

Type locality (ANSP. 163928): WC1. Except in size, this subspecies is intermediate between typical *B. costulata* and *B. robertsi*.

Cepolis (Dialeuca) conspersula negrilensis new subspecies.

Shell nearest *C. c. platystyla* (Pfr.) but smaller with more convex outlines; last whorl weakly subangulate. Color brownish corneous with dark brown subsutural band; last whorl with darker varices and irregular series of small chalky blotches. Alt. of type 14.1 mm., maj. diam. 124 (17.5 mm.), min. diam. 111 (15.7 mm.), alt. apert. 50 (7.1 mm.), diam. apert. 151 (10.7

mm.), $5\frac{1}{4}$ whorls. Type lot varying from 16.4×103 (16.9 mm.) with 6 wh. to 11.6×135 (15.5 mm.) with 5 whorls.

Type locality (ANSP. 163924): WWC.

BURROWING OF SNAILS

BY DAVID T. JONES

Associate Professor of Zoology
University of Utah, Salt Lake City, Utah

While testing temperature reactions of the tiger snail, *Anguispira alternata* (Say), in December of 1932, it was noted that this snail followed a somewhat regular procedure in burrowing which was correlated with certain temperatures. Continuing these observations in December, 1934, I found Utah snails behaved somewhat similarly. The work on *A. alternata* was done in the Zoology Department of Indiana University, with snails secured the same day from the campus. At Utah, the snails had to be collected several weeks prior to the experiments, but they were kept in cool places under conditions as nearly normal as possible. The specimens of *Oreohelix depressa* (Cockerell) and *Discus anthonyi* (Pilsbry) came from City Creek Canyon near Salt Lake City, those of *Physa ampullacea* Gould and *Stagnicola nuttalliana* (Lea) came from the Weber River at Gateway, and those of *Gyraulus vermicularis* (Gould) from Oakley, Utah, farther up Weber Canyon.¹

All tests were made out-of-doors using a liter Erlenmeyer flask, fitted with a two-holed rubber stopper, one hole communicating with the exterior, the other containing a two-inch immersion Centigrade thermometer. Loose soil was placed in the bottom of the flask in all cases. In the case of aquatic snails the sediment was allowed to settle before beginning the experiment. In the case of land snails, the soil and the sides of the flask were moistened to maintain 100% relative humidity. The barometric pressure was not controlled but was allowed to vary naturally with weather and altitude, as specimens of

¹ "Mollusks from Weber Canyon" by David T. Jones, Proc. Utah Acad. Sci., Arts, and Letters, forthcoming Vol. XII, 1935.